

REMARKS

Claims 1-27 are pending in this application.

Claims 5, 7 and 24 have been amended by the present Amendment. Amended claims 5, 7 and 24 do not introduce any new subject matter.

REJECTIONS UNDER 35 U.S.C. § 103:

Reconsideration is respectfully requested of the rejections of claims 1-5, 7-9, 14, 15, 17 and 24-26 under 35 U.S.C. § 103(a) as being unpatentable over admitted prior art in view of Iyer (U.S. Patent No. 6,383,723).

Applicants respectfully submit that admitted prior art (“APA”) and Iyer, when taken alone or in combination, fail to teach or suggest “cleaning oxide residues on an anti-reflective layer using a first cleaning solution”, as recited in claims 1, 9 and 24.

As acknowledged by the Examiner, APA does not teach these features.

The addition of Iyer does not render cleaning oxide residues on an anti-reflective layer. In contrast, unlike the embodiment recited in claims 1, 9 and 24, the disclosure in Iyer suggests removing nitrogen-containing contaminants such as atmospheric ammonia or ammonium ion from an anti-reflective coating (28). See, col. 1, lines 40-50, col. 3, lines 50-55.

Furthermore, there is no motivation to combine APA with Iyer. Examiner states on page 2 of the Office Action that “It would have been obvious...to modify admitted prior art in light of Iyer’s teachings of cleaning the anti-reflective coating (ARC) film because Iyer teaches that cleaning the ARC film before forming the photoresist would reduce the defects such as resist footing and T-topping.” Applicants respectfully disagree.

The resist footing and T-topping disclosed by Iyer are different defects from lifting and clinging disclosed by APA. See, Fig. 1 of Iyer, Fig. 2A of the Instant invention. The resists footing and T-topping are caused by the presence of nitrogen contaminants in the anti-reflective coating or photoresist pattern. See, col. 1, lines 40-50 of Iyer. In contrast, lifting and clinging are caused by oxide residues formed on the surface of the anti-reflective layer, thereby reducing the adhesion strength between the photoresist patterns and the anti-reflective layer. See, page 4, lines 5-10 of the Instant application.

Therefore, claims 1, 9 and 24 are patentable over the cited references. Claims 4-5, 7 and 8 depend from claim 1. Claims 14, 15 and 17 depend from claim 9. Claims 25-26 depend from claim 24. These dependent claims are believed to be patentable over APA in view of Iyer for at least the reason of their dependency on respective base claims 1, 9 and 24.

Applicants respectfully submit that claims 5, 15 and 26 are patentable over the references for additional reasons. For instance, APA and Iyer, when taken alone or in combination, fail to teach or suggest “cleaning oxide residues on an anti-reflective layer using a first cleaning solution at a temperature of about 30°C to about 70°C”, as recited in claims 5, 15 and 26.

As acknowledged by the Examiner, APA does not teach these features.

Further, the addition of Iyer does not render the claimed features obvious. In contrast, unlike the embodiment recited in claims 5, 15 and 26, the disclosure in Iyer suggests an elevated temperature range of approximately 70 to 150 °C so that the first

cleaning solution is heated. See., e.g., col. 4, lines 9-44. As such, the claimed range of temperature, which is lower than the prior art range, was not disclosed.

Therefore, based on the foregoing, Applicants respectfully request that the Examiner withdraw the rejections of claims 1-5, 7-9, 14, 15, 17 and 24-26 under 35 U.S.C. § 103(a) and that claims 1-5, 7-9, 14, 15, 17 and 24-26 are in condition for allowance.

Reconsideration is respectfully requested of the rejections of claims 18, 22 and 23 under 35 U.S.C. § 103(a) as being unpatentable over Yang (U.S. Patent No. 6,159,860) in view of Iyer.

Applicants respectfully submit that Yang and Iyer, when taken alone or in combination, fail to teach or suggest “cleaning oxide residues on a hard mask layer using a first cleaning solution”, as recited in amended claim 18.

As acknowledged by the Examiner, Yang does not teach these features.

Further, the addition of Iyer does not render the claimed features obvious for at least the same reasons provided above.

Therefore, claim 18 is patentable over the cited references. Claims 22 and 23 depend from claim 18. These dependent claims are believed to be patentable over Yang in view of Iyer for at least the reason of their dependency on base claim 18.

Applicants respectfully submit that claim 22 is patentable over the references for additional reasons. For instance, APA and Iyer, when taken alone or in combination, fail to teach or suggest “cleaning oxide residues on a hard mask layer using a first cleaning solution at a temperature of about 30°C to about 70°C ”, as recited in claim 22.

As acknowledged by the Examiner, Yang does not teach these features.

Further, the addition of Iyer does not render the claimed features obvious for at least the same reasons provided above.

Therefore, based on the foregoing, Applicants respectfully request that the Examiner withdraw the rejections of claims 18, 22 and 23 under 35 U.S.C. § 103(a) and that claims 18, 22 and 23 are in condition for allowance.

Reconsideration is respectfully requested of the rejections of claims 6, 16 and 27 under 35 U.S.C. § 103(a) as being unpatentable over admitted prior art/Iyer or Yang/Iyer as applied to claims 1, 9 and 24 above, and further in view of Schulz (U.S. Patent No. 5,637,151).

Claim 6 depends from claim 1, claim 16 depends from claim 9, and claim 27 depends from claim 24. Claims 6, 16 and 27 are believed to be patentable over the combination of cited references for at least the same reasons given above for respective base claims 1, 9 and 24 because none of the combination of references discloses or suggests, for example, “cleaning oxide residues on an anti-reflective layer using a first cleaning solution”.

Indeed, as explained above, APA, Iyer and Yang does not disclose or suggest these features. Schulz does not cure the deficiencies of APA, Iyer and Yang. Accordingly, reconsideration of the obviousness rejections is respectfully requested.

Reconsideration is respectfully requested of the rejections of claims 10-13 and 19-21 under 35 U.S.C. § 103(a) as being unpatentable over admitted prior art/Iyer or Yang/Iyer as applied to claims 9 and 18 above, and further in view of Okoroanyanwu (U.S. Patent No. 6,753,247).

Claims 10-13 depend from claim 9 and claims 19-21 depend from claim 18.

Claims 10-13 and 19-21 are believed to be patentable over the combination of cited references for at least the same reasons given above for respective base claims 9 and 18 because none of the combination of references discloses or suggests, for example, "cleaning oxide residues on an anti-reflective layer using a first cleaning solution".

Indeed, as explained above, APA, Iyer and Yang does not disclose or suggest these features. Okoroanyanwu does not cure the deficiencies of APA, Iyer and Yang. Accordingly, reconsideration of the obviousness rejections is respectfully requested.

For the foregoing reasons, the present application, including claims 1-27, is believed to be in condition for allowance.

An early and favorable reconsideration is earnestly solicited. If the Examiner has any further questions or comments, the Examiner may telephone Applicants' Attorney to reach a prompt disposition of this application.

Respectfully submitted,



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